**PH1011 - Physics 1A**

**Credits:** 20.0  
**Number of Lectures:** 44  
**Semester:** 1  
**Lecturer:** Dr Peter Woitke (co-ordinator), Dr Duncan Forgan, Dr Bruce Sinclair and Dr Cameron Rae (lab co-ordinator)

**Academic Year:** 2018-19

**Overview**  
The two first level modules in physics provide a balanced introduction to university physics, assuming a prior knowledge of mathematics and physics that corresponds to Higher grade passes at B in these subjects. The modules include appropriate coverage of the traditional disciplines of classical physics, but also exposure to the ideas of modern physics including quantum concepts, and to applications including laser physics and optical communications. It is intended that the two modules should be similar in standard to that of the Advanced Higher in Physics although the syllabus will not match in every detail.

**Aims & Objectives**  
In PH1011 we introduce the building blocks that will be required for students who wish to move on to further study in this area or indeed other scientific disciplines. An aim is for students to obtain a good understanding and working knowledge of the core subjects of mechanics, waves and optics, and the properties of matter. This is brought about by lectures, tutorials, problem-solving workshops, and labs covering Newton’s laws of mechanics, linear momentum and energy conservation, simple harmonic motion, the different types of wave motion, geometrical and wave optics, the nature and composition of nuclei, atoms, molecules, solids, and gases. Other aims include increasing competence in qualitative and quantitative problem solving, the development of investigative techniques, and the development of the ability to be a self-directed learner.

**Learning Outcomes**  
Students who take Physics 1A and/or Physics 1B should acquire

- an understanding of the topics covered in the module, such that they can explain the physical principles involved,
- an ability to solve qualitative and quantitative problems based on the lecture material,
- a competence in using some of the standard equipment in physics laboratories,
- an appreciation of uncertainty analysis in experimental work,
- an ability to model a real-world problem using physical concepts.

**Synopsis**  
**Mechanics 1** (11 lectures) Dr Peter Woitke  

**Waves and Optics** (16 lectures) Dr Bruce Sinclair  
interferometer and its use in precision length measurements. Anti-reflection coatings and thin-film interference. Multiple-beam interference. Wavelength separation by diffraction grating.

Properties of Matter (17 lectures) Dr Duncan Forgan

Laboratory work (9 sessions) Dr Cameron Rae
Lab Skills development programme incorporating: Measurement precision and accuracy; Error propagation; Use of Instrumentation; Data analysis and graphical representation using Excel; Laboratory notebook keeping. Experimental Investigation: Properties of Matter (Heat Capacity); Mechanics (Centripetal Acceleration); Waves and Optics (Sonometer).

Maths workshops.

Pre-requisites
Passes in SQA Higher or A-level in Mathematics and Physics, both at grade B or better, or equivalent.

Anti-requisites
AS1002

Assessment
2 Hour Examination = 60%, Class Test = 15%, Practical work = 25%

Additional information on continuous assessment etc.

Recommended Books
Please view University online record: http://resourcelists.st-andrews.ac.uk/modules/ph1011.html

General Information
Please also read the additional information in the School's handbook for first and second level modules.